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U. S. Department of Agriculture
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FOR FIVE FRESH FRUITS AND VEGETABLES

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Compiled by
Dana G. Dalrymple*

This paper summarizes estimates of demand relationships for five fresh fruits and vegetables (apples, grapefruit, tomatoes, Irish and sweet potatoes) for the 1948-1962 period which were recently calculated by Frederick V. Waugh.^{1/} Waugh indicates that the demand relationships were derived for illustrative purposes and that "Both for theoretical purposes and for such applications as price forecasting and program appraisal, I would strongly prefer special analyses by economists with intimate knowledge . . . of each particular commodity."^{2/}

1. Price Flexibilities with Respect to Quantity

Price flexibilities refer to the change in expected price with respect to the change in quantity consumed, holding income constant. Waugh obtained the following estimates:

<u>Commodity</u>	<u>Farm Level</u>	<u>Retail Level</u>
Apples	-1.43	-0.81
Grapefruit	-2.06	-0.82
Tomatoes	-1.03	-0.85
Irish Potatoes	-5.28	-2.57
Sweet Potatoes	-1.15	-0.76

*Economist, Fruit and Vegetable Marketing, Division of Marketing and Utilization Sciences.

^{1/}Demand and Price Analysis; Some Examples from Agriculture, U. S. Department of Agriculture, Economic Research Service, Technical Bulletin No. 1316, November 1964, pp. 27-38.

^{2/}Recent such estimates for apples are summarized and discussed in my paper, "Some Economic Considerations in Assessing Diversion Programs for Apples," U. S. Department of Agriculture, Federal Extension Service, Mimeo D-9, February 1964, pp. 2-5.

2. Price Elasticities of Demand

The reciprocal of price flexibility with respect to quantity is price elasticity of demand. Waugh prefers price flexibilities,^{3/} but since elasticities are so commonly used, I have calculated them from the above data.^{4/}

<u>Commodity</u>	<u>Farm Level</u>	<u>Retail Level</u>
Apples	-0.70	-1.24
Grapefruit	-0.48	-1.22
Tomatoes	-0.97	-1.17
Irish Potatoes	-0.19	-0.39
Sweet Potatoes	-0.87	-1.31

3. Farm-Retail Relationships

It will be noted that price elasticities of demand in each case were greater at retail than at the farm level. Moreover, for all five items the demand was inelastic at the farm level; for four the demand was elastic at the retail level. The greater elasticity at retail is to be expected.^{5/}

Waugh goes on to suggest that the price spreads ". . . tend to be somewhat between percentage and absolute amounts, and that they are probably somewhat closer to absolute amounts than percentages." This, too, is to be expected.^{6/}

^{3/}Problems of using elasticities are well discussed by Waugh, op. cit., p. 8. and L. V. Manderscheid, "Some Observations in Interpreting Measured Demand Elasticities," Journal of Farm Economics, February 1964, pp. 128-136.

^{4/}The flexibilities were derived from equations with price dependent. For purposes of deriving elasticities of demand, it would have been preferable to use equations with quantity dependent. As this was not done, the elasticities reported here may be less precise than they might have been.

^{5/}For a discussion of this point see my paper, On the Nature of Marketing Margins, Michigan State University, Department of Agricultural Economics, Ag. Econ. 824, April 1961, pp. 2-4.

^{6/}Ibid., pp. 5-7. I have discussed this matter with respect to apples in my Ph. D. dissertation, "Economic Aspects of Apple Marketing in the United States," Michigan State, 1962, pp. 190-201. Also see M. T. G. Meulenberg, Short Run Fluctuations of Retail Margins: Vegetables in the Netherlands, Mededelingen Van De Landbouwhogeschool, Wageningen, 1964 (64-13), 13 pp.

4. Price Flexibilities with Respect to Income

Waugh also calculated price flexibilities with respect to income, holding quantity constant. His results are as follows:

<u>Commodity</u>	<u>Farm Level</u>	<u>Retail Level</u>
Apples	-0.16	0.32
Grapefruit	0	0.55
Tomatoes	0	0.36
Irish Potatoes	-1.44	0.21
Sweet Potatoes	-1.66	-0.63

5. Income Elasticities of Demand

It is not possible to transform price flexibilities with respect to income into income elasticities of demand.^{7/} Therefore, one desiring income elasticities must turn to other studies. Brandow reports the following estimates for the U. S. for the 1955-57 period: fruits 0.40, vegetables 0.15, and potatoes 0.08.^{8/} Estimates based on Atlanta consumer panel data are provided for 30 fruits and vegetables by Purcell and Ford.^{9/}

^{7/}Based on a discussion with Dr. Waugh, December 15, 1964.

^{8/}G. E. Brandow, Internations Among Demands for Farm Products and Implications for Control of Market Supply, Pennsylvania State University, Agricultural Experiment Station, Bulletin 680, August 1961, p. 17.

^{9/}See J. C. Purcell and K. E. Ford, Consumption Requirements and Prospective Demand for Fruits and Vegetables in the South, University of Georgia, Agricultural Experiment Station, Special Report, October 1964, p. 4.

